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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/669,448	09/25/2000	Ryouji Hiroyama	001241	2968

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EXAMINER

LANDAU, MATTHEW C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 05/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/669,448

Applicant(s)

HIROYAMA ET AL.

Examiner

Matthew Landau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-16 is/are pending in the application.
- 4a) Of the above claim(s) 9-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Objections

1. Claim 2 is objected to because of the following informalities: the limitation “in a sum of a contents” is unclear. The limitation “and III elements” in line 4 of the claim should be changed to read “as group [and] III elements”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In regards to claim 1, the limitation “containing A1 as a group III element in this order” renders the claim indefinite. There is insufficient antecedent basis for the limitation “this order” in the claim. Furthermore, it is unclear how a layer can contain an element in a specific order.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. Claims 1, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidoguchi et al. (US Pat. 6,118,800, hereinafter Kidoguchi) in view of Okajima et al. (US Pat. 5,065,404, hereinafter Okajima).

In regards to claim 1, as best the examiner can ascertain the claimed invention, Figure 11 of Kidoguchi discloses a semiconductor laser device comprising: a substrate 1001; a first conductivity type cladding layer 1002; an emission layer 1003; a second conductivity type cladding layer 1007 containing Al as a group III element and formed with a ridge portion; and a current blocking layer 1006, formed on said second conductivity type cladding layer around said ridge portion, containing Al as a group III element, and a distance t between said emission layer and said current blocking layer satisfies the relation of $t \leq 0.275/(1 - (X2 - X1))$ micrometers assuming that $X1$ (0.4) represents the composition ratio of Al in group III elements forming said second conductivity type cladding layer, $X2$ (0.6) represents the composition ratio of Al in group III elements forming said current blocking layer, and $t=0.155$ micrometers (see Table 2). The difference between Kidoguchi and the claimed invention is an angle θ of inclination on the side surfaces of said ridge portion with respect to the upper surface of said substrate is at least 70 degrees and not ore than 117 degrees. Figure 1 of Okajima discloses a cladding layer 18a formed with a ridge portion. It can be clearly ascertained from Figure 1, the angle of inclination of the ridge portion with respect to the substrate is 90 degrees. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kidoguchi by changing the angle θ of inclination to 90 degrees. The ordinary artisan would have been motivated to modify Kidoguchi in the manner described above for the purpose of simplifying the fabrication process. A further difference between Kidoguchi and the

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claimed invention is a lower width W of said ridge portion is at least $2\text{ }\mu\text{m}$ and not more than $5\text{ }\mu\text{m}$. Okajima disclose a ridge portion with a lower width W of $2.5\text{ }\mu\text{m}$. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Kidoguchi by using a width of $2.5\text{ }\mu\text{m}$ for the purpose of obtaining stable transverse-mode oscillation.

In regards to claim 4, Kidoguchi discloses said distance t ($0.155\text{ }\mu\text{m}$) satisfies the relation of $t \leq 0.252/(1 - (X2 - X1))$ micrometers (see Figure 11 and Table 2).

In regards to claims 5, Kidoguchi discloses said distance $t = 0.155\text{ }\mu\text{m}$ (see Table 2).

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kidoguchi in view of Okajima as applied to claim 1 above, and further in view of Goto et al. (US Pat. 65,608,752, hereinafter Goto).

In regards to claim 2, Figure 11 of Kidoguchi discloses said current blocking layer 1006 contains Al and Ga, as group III elements, and $X2$ represents the composition ratio of Al in the sum of a contents of Al and Ga. A further difference between Kidoguchi and the claim invention is said first conductivity type cladding layer contains Al and Ga as group III elements, and $X1$ represents a composition ratio of Al in a sum of a contents of Al and Ga. Figure 1 of Goto discloses a ridge type semiconductor laser comprising an n-type $\text{Al}_x\text{Ga}_{1-x}\text{As}$ cladding layer 3 and a p-type $\text{Al}_x\text{Ga}_{1-x}\text{As}$ cladding layer 7. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Kidoguchi by using the same Al composition ($X1$) in the first conductivity type cladding layer and the second conductivity type cladding layer. The ordinary artisan would have been

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motivated to modify Kidoguchi in the manner described above for the purpose of simplifying the production process.

In regards to claim 3, Figure 11 of Kidoguchi discloses said second conductivity type cladding layer is made of $\text{Al}_{x1}\text{Ga}_{1-x1}\text{As}$, and said current blocking layer is made of $\text{Al}_{x2}\text{Ga}_{1-x2}\text{As}$.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kidoguchi and Okajima as applied to claim 1 above, and further in view of Narui et al.

In regards to claim 7, a further difference between Kidoguchi and the claimed invention is the upper surface of said substrate is the $\{100\}$ plane or inclined by several degrees from the $\{100\}$ plane, and said ridge portion extends in the $\langle 011 \rangle$ direction. Figure 1 of Narui discloses a semiconductor laser wherein the substrate 1 has a (100) surface orientation and a ridge portion extending in the [011] direction (see column 1, lines 12-31). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Kidoguchi by orienting the upper surface of the substrate in the $\{100\}$ plane and extending the ridge portion in the $\langle 011 \rangle$ direction. The ordinary artisan would have been motivated to modify Kidoguchi in the manner described above for the purpose of fabricating a low threshold current semiconductor laser.

7. Claims 1, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawano in view of Okajima.

In regards to claim 1, as best the examiner can ascertain the claimed invention, Figure 2 of Kawano discloses a semiconductor laser device comprising: a substrate 11; a first conductivity

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type cladding layer 13; an emission layer 14; a second conductivity type cladding layer 16 containing Al as a group III element and formed with a ridge portion; and a current blocking layer 18, formed on said second conductivity type cladding layer around said ridge portion, containing Al as a group III element, and a distance t between said emission layer and said current blocking layer satisfies the relation of $t \leq 0.275/(1 - (X2 - X1))$ micrometers assuming that $X1$ (0.6) represents the composition ratio of Al in group III elements forming said second conductivity type cladding layer, $X2$ (0.7) represents the composition ratio of Al in group III elements forming said current blocking layer, and $t=0.3$ micrometers (column 2, lines 44-68 to column 3, lines 1-5). The difference between Kidoguchi and the claimed invention is an angle θ of inclination on the side surfaces of said ridge portion with respect to the upper surface of said substrate is at least 70 degrees and not ore than 117 degrees. Figure 1 of Okajima discloses a cladding layer 18a formed with a ridge portion. It can be clearly ascertained from Figure 1, the angle of inclination of the ridge portion with respect to the substrate is 90 degrees. In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Kidoguchi by changing the angle θ of inclination to 90 degrees. The ordinary artisan would have been motivated to modify Kidoguchi in the manner described above for the purpose of simplifying the fabrication process. A further difference between Kidoguchi and the claimed invention is a lower width W of said ridge portion is at least 2 μm and not more than 5 μm . Okajima disclose a ridge portion with a lower width W of 2.5 μm . In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to further modify the invention of Kidoguchi by using a width of 2.5 μm for the purpose of obtaining stable transverse-mode oscillation.

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In regards to claims 5 and 6, Kawano discloses the thickness t is $0.3\ \mu\text{m}$ (column 2, lines 65-68).

Response to Arguments

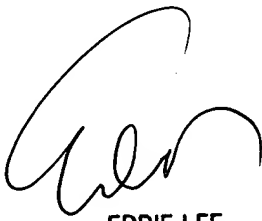
8. Applicant's arguments with respect to claims 1-7 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew C. Landau whose telephone number is (703) 305-4396.

The examiner can normally be reached from 8:00 AM-4:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Matthew C. Landau

Examiner

May 20, 2003